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Central Banking and Money Market Changes

Hyman P. Minsky Ph.D.

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No. 2

By HYMAN P. MINSKY

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I. INTRODUCTION

The ability of a central bank to achieve its objectives depends upon how its operations affect the various elements that make up the money market. Hence, the efficacy of any particular technique of monetary policy depends upon the financial institutions and usages that exist. If financial institutions do not change significantly, then, once the efficacy of the various central bank operations is established, financial institutions can be ignored in discussions of monetary policy. However, if a period of rapid changes in the structure or in the mode of functioning of financial markets occurs, then the efficacy of central bank actions has to be re-examined.

Changes in financial institutions and money-market usages are the result of either legislation or evolution. Legislated changes typically are the result of some real or imagined malfunctioning of the monetary-financial system and hence they usually are accompanied by discussions of their impact. Evolutionary changes occur typically in response to some profit possibilities which exist in the money market. As the evolved changes often center around some technical detail of money-market behavior and as they usually start on a small scale, their significance for monetary policy is generally ignored at the time they first occur. Only if, at a later date, some malfunctioning of the financial system is imputed to such an evolved money-market institution will it be discussed, and then the discussion usually occurs

* The observations upon which Part II of this paper is based were made while I was in New York City on a fellowship sponsored by the Joint Committee on Education of the American Securities business. I wish to thank J. Margolis, R. Miller and R. Roosa for helpful comments and suggestions.

as a prelude to "corrective" legislation. Awareness of the conditions which induce institutional changes in the money market and knowledge of the typical effects of such institutional changes should enable the Federal Reserve or the legislating authorities either to take preventive measures or to be ready to minimize the effects of a "crisis" when one occurs.

As evolutionary changes in financial institutions and usages are the result of profit-seeking activities, the expectation is that such financial changes will occur most frequently during periods of high or rising interest rates. Such rates are evidence of a vigorous demand for financing relative to the available supply. They act as a signal to money-market professionals to seek ways of using the available lending ability more efficiently.¹

Essentially, the relations upon which the monetary authorities base their operations are predicated upon the assumption that a given set of institutions and usages exists. If the operations of the authorities have side effects in that they induce changes in financial institutions and usages, then the relations "shift." As a result, the effects of monetary operations can be quite different from those desired. To the extent that institutional evolution is induced by high or rising interest rates, this would be particularly significant when the central bank is enforcing monetary constraint in an effort to halt inflationary pressures.²

In the recent past (1954 to date) short-term interest rates in the United States have been relatively high and rising. During this period at least two changes in the American money market have occurred: the development and growth of the federal funds market;

1. "The basic functioning of financial institutions is the mobilization of the financial resources of the economy in support of economic activity, and I suggest that when credit conditions are tightened and the creation of new money through the banking system is restricted, the financial machinery of the country automatically begins to work in such a way as to mobilize the existing supply of money more effectively, thus permitting it to do most of the work that would have been done by newly created money had credit conditions been easier" (Warren L. Smith, "On the Effectiveness of Monetary Policy," *American Economic Review*, XLVI (Sept. 1956), 601). Smith's point that the more effective utilization of a given monetary supply counteracts, at least in part, tight credit conditions is well taken. However, the assertions that it automatically begins to operate and that it occurs within an unchanging institutional framework are, I believe, incorrect.

2. "Moreover, any rise in interest rates brought about perhaps by a combination of restrictive monetary policy and accumulating debt creates the opportunities for non-bank intermediaries to offer more expensive attractions to creditors and hence to compete more actively with banks" (John G. Gurley and E. S. Shaw, "Financial Aspects of Economic Development," *American Economic Review*, XLV (Sept. 1955), 532). Gurley and Shaw deal with the evolution of financial institutions in a growth context and hence they tend to take for granted the inducements to, and the facts of, institutional change.

and the increase in the importance of nonfinancial corporations in financing government bond houses. In Section II these two evolved developments are described and examined, in Section III the implications of these particular changes for Federal Reserve policy are taken up, and in Section IV the implications for monetary policy of the expectation that money-market institutions will change are investigated.

II. TWO RECENT INSTITUTIONAL CHANGES

A. The Federal Funds Market

There is no single trading center where the full scope of the federal funds market can be observed. One brokerage house in New York has for many years, however, played an important role in the market.³ The best possible view of the market, from any single vantage point, is probably that obtained by observing this firm's operations.

At the end of June, 1956, Garvin, Bantel and Company had some 79 commercial banks and 14 other financial institutions as clients for transactions in federal funds. Not all sales or loans of federal funds are cleared through the brokerage facilities of this firm. A substantial volume of transactions occurs, for example, through the network of correspondent relations among banks, at times in the form of direct loans between banks. However, for the transactions which do not pass through the worksheet of Garvin, Bantel and Company the rate is thought to be typically the same as that which emerges from the offerings and bids brought together through their office.⁴

Reserves at the Federal Reserve Banks are the commodity in which the federal funds market deals. The transaction is an unsecured overnight loan between banks.⁵ Among New York City banks this is accomplished by an exchange of checks, the lending bank gives the borrowing bank a draft on the Federal Reserve Bank, and the borrow-

3. I wish to thank George Garvin and Ralph de Paola of Garvin, Bantel and Company for their kindness in explaining their operations to an academician. The following analysis of the characteristics of their clients is based upon their worksheet. I wish to emphasize that only the segment of the national market which relies upon the brokerage facilities of that firm is described here. I alone am responsible for the reporting and the interpretation which follows.

4. For a good introduction to the mechanics of the federal funds market see Nadler, Heller and Shipman, *The Money Market and Its Institutions* (New York: The Ronald Press, 1955).

5. A more comprehensive survey of the entire market was reportedly undertaken by a special committee of the Federal Reserve System some time in 1956. Pending the completion of that study, which has been kept on a confidential basis up to the time of this writing, it is difficult to generalize with any certainty about the market as a whole.

6. At times, government bond houses, as the result of a sale of bonds to the Federal Reserve System, will lend (sell) federal funds.

ing bank gives the lending bank a check drawn on itself. As it takes one day for a check to clear, the borrowing bank's overnight balance at the Federal Reserve Bank is increased by this transaction.⁶ For non-New York City banks, a telegraphic transfer of reserve balances in one direction today is offset by a telegraphic transfer of reserve balances in the opposite direction at the opening of the next business day. These reserve balances can be and are freely transferred between Federal Reserve districts.⁷

Obviously a loan of federal funds decreases the reserve balance of the lending bank and increases the reserve balance of the borrowing bank. During a period of negative free reserves,⁸ a bank which actively participates in this market aims at not having excess reserves, over the averaging period, greater than the unit of transactions. Also a bank active in this market might not borrow from its Federal Reserve Bank unless there are no federal funds available. The benefit to the lending bank is obvious: it earns interest on what would have been an idle balance. The borrowing bank benefits in not having to borrow at its reserve bank. In contrast, for a bank not in the federal funds market, a reserve deficiency results in its either selling assets or borrowing at the reserve bank, and any short-run excess of reserves remains on its books.

The interest rate on federal funds is never greater than the discount rate. During periods when there are sizeable negative free reserves, the federal funds rate usually is equal to the discount rate. Most banks average their reserves over the assigned period by building an excess reserve position at the beginning of the averaging period and then allowing reserve deficits to accumulate during the latter part of the period so that, as a result of the dominance of the weekly reporting member banks in the federal funds market, a rate pattern has developed. During periods of sizeable negative free reserves, the federal funds rate is equal to the discount rate except, perhaps, on Wednesday when it often is lower than the discount rate. There is some evidence that by midyear 1956 some banks were beginning to play this interest rate pattern.

Of the 79 commercial banks which actively participate in the federal funds market by using the facilities of Garvin, Bantel and

6. In computing reserve requirements, the deposits are taken as of the beginning of a business day whereas the reserves are calculated as of the close of the day.

7. When the discount rate is not the same in all districts, some banks will not lend reserves from low to high discount rate districts. Also some New York banks will not allow their federal funds to be loaned outside the New York district.

8. Free reserves are excess reserves minus borrowings at the Federal Reserve Banks.

Company for all or part of their federal funds transactions, 24 are Central Reserve City Banks, 39 are Reserve City Banks and 16 are Country Banks. Of course, the largest and most active group of banks using Garvin, Bantel and Company's facilities are the 24 New York and Chicago banks.⁹ The large number of Reserve City and Country banks participating is evidence that the market is national.

The effective limiting factor determining whether or not a bank will take part in the federal funds market is the size of the bank. It does cost something to take part: the time of an officer, phone calls, etc. The broker charges 1/16 of 1 per cent "each way" to banks outside of New York City which do not use his facilities for stock and bond business. As the loan is an overnight loan, the interest at 2¾ per cent on one million dollars for one day is \$76.389 and the broker's commission on a one million dollar loan (1/16 of 1 per cent each way) is \$3.472. As a result of such considerations the unit of trading in midyear 1956 was around one-half million dollars, and each participating bank was expected to deal in several units. Since the maximum allowable loan to any one borrower (excluding the federal government) by a National Bank is 10 per cent of the bank's capital and surplus, no National Bank with less than five million dollars of capital accounts can participate. An examination of the balance sheets of banks shows this to be the case.¹

In addition to the capital limitation, the broker expects each bank either to borrow or lend, with some regularity, several such half-million dollar units. Thus a participating bank must often have a one or two million dollar excess or deficit reserve position. Of the 79 banks listed by Garvin, Bantel and Company only 4 had less than \$100 millions in deposits and another 14 had deposits of between \$100 and \$200 millions. Six of these 18 smaller banks were in the New York metropolitan area and 4 were in Chicago.

The existence of the federal funds market makes a given volume of reserves more efficient in supporting deposits. If each bank deals with the Federal Reserve Bank on the basis of its own needs, then the excess reserves of some banks are not available to support deposits at deficit banks, which are forced either to borrow at the Federal

9. Because of the peculiar Illinois unit banking law, some of the smallest banks (ranked by deposits) which participate in the federal funds market are in Chicago.

1. Information about the banks listed on Garvin, Bantel and Company's worksheet was obtained from *Moody's Bank and Financial Manual, 1956*, especially the table "The Three Hundred Largest Banks in the United States," pp. a 22-23.

All of the data cited about particular banks are as of December 31, 1955.

Reserve Bank or to sell securities. If a perfectly functioning federal funds market existed, no borrowing from the Federal Reserve System would take place while there were excess reserves in any bank, and no bank would have excess reserves while some other bank was borrowing.

As a result of the development of the federal funds market a basic change has taken place in the operations of a part of the banking system. For a participating bank it is not its own reserve position which determines whether or not it will borrow at the Federal Reserve Bank, and no longer does borrowing by a particular bank imply that excess reserves are being generated in the system. To illustrate the argument, assume a 20 per cent reserve requirement and Bank A to have a \$10 million clearing loss to Bank B, so that Bank A has a deficit and Bank B an excess of \$8 millions in reserves. Without participation by these banks in the federal funds market, Bank A would borrow \$8 millions from its reserve bank and Bank B would make \$8 millions of loans or investments: hence total demand deposits increase. However, if both Bank A and B participate in the federal funds market, then Bank A will borrow and Bank B will lend \$8 millions through the market. If the market is tight, some residual deficit bank will end up borrowing at the Federal Reserve: but it is the market situation rather than the behavior of a particular bank which leads to this borrowing.²

B. The Financing of Government Bond Houses: Sale and Repurchase Agreements with Nonfinancial Corporations

In midyear 1956 sale and repurchase agreements with nonfinancial corporations were a major source of funds for government bond houses. Although the contract between the bond house and the nonfinancial corporation is ostensibly a sale of government debt instruments with a tied repurchase agreement, in truth the transaction is a collateral loan callable both ways. The lending corporation does not earn the interest accruals on the "purchased" debt instruments, rather the corporation earns a stated contractual interest rate.

In addition to these sales and repurchase agreements with nonfinancial corporations, government bond houses can finance their inventory (position) by their own resources, by sales and repurchase agreements with the Federal Reserve System (presumably at the initiative of the open market committee), and by borrowing at com-

2. There are obvious similarities between the federal funds market and the classical London discount market and in particular in the part played by Garvin, Bantel and Company and by Gurneys. See W. T. C. King, *The History of the London Discount Market* (London, 1936).

mercial banks. The bond houses' own resources can finance only a small portion of their inventories; therefore the behavior of the bond houses and hence of the government bond market depends upon the characteristics of these different sources of funds.

A call loan to a government bond house, secured by government debt, is in many ways a superior asset to a Treasury bill. Hence, one would expect that the interest rate on sale and repurchase agreements between government bond houses and nonfinancial corporations would be lower than the rate on Treasury bills. This expectation is not borne out by the facts: the rate at which government bond houses borrow from nonfinancial corporations is greater than the bill rate, although it is lower than the rate at which government bond houses borrow from commercial banks.³ Apparently, the rate charged by nonfinancial corporations is low enough so that the government bond houses do not lose on carrying issues with a higher yield than Treasury bills.

Sale and repurchase agreements between government bond houses and the Federal Reserve are almost always at the discount rate.⁴ As the initiative is with the Federal Reserve, such accommodations are a privilege rather than a right of the government bond houses.⁵ Hence, to the bond houses, such funds are unreliable and they will not make commitments in the expectation that they will be accommodated at the Reserve Banks.⁶

3. My own explanation is that the premium rate on sales and repurchase agreements reflects both the newness of these agreements and the risk due to the lack of a guarantee that the bond houses can replace such call loans by tapping the Federal Reserve.

4. The authorization, as of August 2, 1955, by the Open Market Committee for sales and repurchase agreements between government bond houses and the Federal Reserve System provides that: "In no event shall [they] be at a rate below whichever is the lower of (1) the discount rate of the Federal Reserve Bank on eligible commercial paper, or (2) the average issuing rate on the most recent issue of three month Treasury bills, . . ." However, this is with the "understanding that the authority would be used sparingly in entering into repurchase agreements at rates below the discount rate" (*Forty-Second Annual Report of the Board of Governors of the Federal Reserve System*, pp. 102-3).

5. In July, 1955, the Open Market Committee rejected a proposal to " . . . establish at the Federal Reserve Banks an open window for use in financing dealers at rates preferably above, but not lower than, the discount rate" (*ibid.*, pp. 100-1).

6. Around the end of June, 1956, the Federal Reserve "opened the window" by letting it be known that it was willing to enter in sale and repurchase agreements with the government bond houses. My interpretation of this event is that at this time nonfinancial corporation funds were being withdrawn from the government bond houses due to tax needs, and, because June 30th is a published balance sheet date for commercial banks, the giant commercial banks did not want to be forced into borrowing from the Federal Reserve to finance the bond houses. This potentially unstable market situation forced a shift in the initiative for repurchase agreements from the Federal Reserve to the government bond houses.

The bond houses always have lines of credit open at the large commercial banks: in fact these banks are the bond house's "lender of last resort." In midyear 1956 the interest rate charged bond houses by these commercial banks ranged from $3\frac{1}{4}$ per cent to $3\frac{1}{2}$ per cent. This was a "penal" rate as it was approximately 1 per cent greater than the yield on Treasury bills and $\frac{1}{2}$ per cent greater than the yield on other government debt. In this situation, when government bond houses financed their position by borrowing from banks, they would lose money on the carry. Hence by midyear 1956, government bond houses did not finance their position by borrowing at commercial banks unless they were forced to do so by the unavailability of other funds. In contrast, during the easy money days, government bond houses financed their position by borrowing at the giant commercial banks, and the interest rate structure was such that they made money on the carry.

In midyear 1956, the interest rate pattern relevant to the operations of government bond houses was (in order, beginning with the lowest interest rates):

- (1) Treasury bills
- (2) sales and repurchase agreements with nonfinancial corporations
- (3) discount rate
- (4) longer-term government debt
- (5) bank loans to government bond houses (the lowest bank interest rate).

As the yield on Treasury bills was much lower than the interest rate charged bond houses by commercial banks, there was considerable pressure for bond houses to use and develop alternative sources of funds.

Due to the intermittent pattern of tax, dividend and interest payments, giant nonfinancial corporations have periodic needs for large amounts of cash which they satisfy by accumulating "liquidity" out of earnings. Among the forms in which "liquidity" can be held are:

- (1) demand deposits
- (2) Treasury bills
- (3) sale and repurchase agreements with government bond dealers
- (4) loans to sales finance companies.

As commercial banks are forbidden to pay interest on demand deposits, such holdings yield no income. Given the very easy money position and the associated low short-term interest rates which ruled

from 1935 to the early 1950's, the holding of demand deposits did not mean any substantial loss of income. The developing higher interest rate pattern of the 1950's means that increasingly the substantial cash balances of nonfinancial corporations have been invested in short-term liquid assets. As a result of the ability and willingness of nonfinancial corporations to hold Treasury bills, the holdings of Treasury bills by commercial banks have decreased from \$7.0 billions in 1952 to \$2.2 billions in 1956, as shown in Table I.

TABLE I
OWNERSHIP OF TREASURY BILLS, 1952-1956¹
(in billions of dollars)

Date	Total Outstanding	Held by	
		Commercial Banks	Other Investors (includes nonfinancial corporations)
Dec. 31, 1952	21.7	7.0	12.5
Dec. 31, 1953	19.5	4.4	11.4
Dec. 31, 1954	19.5	4.4	12.1
Dec. 31, 1955	22.3	3.6	16.0
June 30, 1956	20.8	2.2	17.1
Oct 31 56	25.2	4.9	17.7

¹ Federal Reserve Bulletin: Table titled "Ownership of United States Government Marketable and Convertible Securities" (various issues).

On the other hand the holdings of other investors (which include the nonfinancial corporations) have increased from \$12.5 billions in 1952 to \$17.1 billions in 1956. The same trend is evident in the ownership of marketable securities maturing within one year (Table II).

TABLE II
OWNERSHIP OF MARKETABLE ISSUES MATURING WITHIN ONE YEAR, 1952-1956¹
(in billions of dollars)

Date	Total Outstanding	Held by	
		Commercial Banks	Other Investors (includes nonfinancial corporations)
Dec. 31, 1952	57.0	17.0	23.5
Dec. 31, 1953	73.2	25.1	29.0
Dec. 31, 1954	62.8	15.7	26.3
Dec. 31, 1955	60.6	7.7	30.8
June 30, 1956	58.7	7.4	29.2
Oct 31 57	68.6	11.4	32.9

¹ Federal Reserve Bulletin (various issues).

June 30 57 71.0 12.3 35.9

The nonfinancial corporations can also hold liquidity in the form of sales and repurchase agreements with government bond houses and the paper of sales finance companies. The paper of sales finance companies earns a higher yield and can be tailor-made to suit the needs of the lender, but it is neither so liquid nor so respectable an asset for a nonfinancial corporation to hold as Treasury bills. Sales and repurchase agreements between nonfinancial corporations and bond houses are very liquid and can be tailor-made. The agreement does seem to be superior to an outright purchase of Treasury bills by the corporations, and it certainly is superior to their outright purchase of longer term issues. As was stated earlier, by midyear 1956 such corporation funds were, as far as could be judged, the major financing source for the government bond houses.

Both developments, the shift of short-term government debt and of the financing of government bond houses from commercial banks to nonfinancial corporations, have freed bank resources to finance other activities. As far as the ability of the banking system to finance expansion is concerned, these developments are equivalent to an increase in bank reserves.

Expansion of the bond houses' nonfinancial corporation sales and repurchase agreements seems likely to occur. If nonfinancial corporations should find loans to bond houses preferable to ownership of Treasury bills, then the rates on Treasury bills would increase and the rate on sales and repurchase agreements would decrease relative to other rates. The "fully developed" market would be in equilibrium when the rate on sales and repurchase agreements was fractionally lower than or equal to the bill rate. The discount rate would remain higher than the bill rate. In this event, the bond houses would be dealers.

What are the implications of the market structure detailed above? Any withdrawal of corporation money will force the government bond houses to borrow from commercial banks. With the present interest rate pattern, this contingency makes it risky for bond houses to take a position. In addition if corporate funds are withdrawn from bond houses because of economic conditions, this will be associated with the sale or the running down of corporation holdings of Treasury bills. As government bond houses are only guaranteed expensive commercial bank financing, they hesitate to take a position in a falling market. Hence, unless the Federal Reserve acts promptly to carry the bond houses or to buy Treasury bills, interest rates will rise rapidly. As the sale and running down of Treasury bills by nonfinancial corporations indicates that they desire increased liquidity (which could be associated with a downward shift in the investment schedule) such a rise

in interest rates would occur at the "wrong" time. To counteract this, a money market which is based upon short-term lending by nonfinancial institutions requires a device which automatically feeds reserves into the system when the lenders desire increased liquidity, e.g., a mechanism is needed which automatically increases the quantity of money to compensate for a decrease in the velocity of money; and vice versa.

There are other considerable dangers in nonfinancial corporations financing the bond houses. Almost all government bond houses deal in other types of paper as well. Once nonfinancial corporations are habituated to making "loans" with government debt as collateral, the possibility exists that collateralized loans using nongovernment paper will develop.⁷ Such a development would entail greater possibilities of capital losses in a liquidity crisis which, in turn, would affect the stability of the nonfinancial corporations.

A seemingly simple solution to the problems raised by nonfinancial corporations financing financial institutions with their idle balances is to allow commercial banks to pay interest on demand deposits. To eliminate the "dangers" of banks competing for deposits, the rate could be tied to the discount rate. A rate structure in which large demand deposits pay about 1 per cent less than the rediscount rate (and there are a number of rates between the deposit and the rediscount rate) seems to be more conducive to financial ~~ability~~ ^{stability} than the existing rate structure. However, such a rate structure requires either a much higher Treasury bill rate or a special source of financing for government bond houses to replace the sale and repurchase agreements with nonfinancial corporations. As the development of a special financing setup for bond houses could entail radical institutional changes,⁸ the seemingly simple solution to the problems raised by nonfinancial corporations financing bond houses has quite complex implications.

III. IMPLICATIONS OF THESE CHANGES FOR MONETARY POLICY

Two conclusions stand out as a result of the institutional changes described in the preceding sections:

- (1) a given volume of reserves now supports more deposits;

7. Sales finance corporations do tap corporate cash balances. At present (late 1956) the largest potential source of funds is such corporate balances, and if tight money continues I believe that new type financial institutions will develop which would use these cash balances.

8. For example, the right to rediscount could be withdrawn from the giant commercial banks, and, simultaneously, the government bond houses could be given the right to sale and repurchase agreements. Such a British system would lead to a rate structure compatible with commercial banks paying interest on demand deposits.

- (2) a given volume of demand deposits now supports more bank loans to business.

These changes which have increased the volume of business activity that the banking system can finance have not resulted from legislation or Federal Reserve policy. Rather they have been the result of reactions to opportunities for profit in the money market.

Central bank constraint upon commercial bank reserves during a period diagnosed as inflationary is due to a belief that any increase of bank loans would feed inflation. Since at present interest rates the demand for loans is greater than the supply, these central bank constraints result in higher interest rates. The higher interest rates, in turn, induce institutional changes in the money market which have the effect of increasing lending ability. These institutional changes may or may not lead to a sufficient increase in financing ability to effect the same increase in financing as would have occurred if there had been no central bank constraint.

Within a stable institutional framework, a rise in interest rates tends to make households and business firms conserve their cash balances. As an increase in velocity increases loanable funds, it will at least in part offset the effects of a tight money policy; but, unless the economy is in a state of excess money supply of a liquidity trap type, this offset will not be complete. This can be represented as a positively sloped curve between velocity and the interest rate, and an increase in velocity represents a "permanent" increase in lending ability. Hence, if the institutional framework is stable, a tight money policy will be effective and the interest rate will rise to whatever extent is necessary in order to restrict the demand for financing to the essentially inelastic supply.

However, the rise in interest rates feeds back upon the institutional framework. With rising interest rates the incentives to find new ways to finance operations and new substitutes for cash assets increase. The money market is highly competitive and, as larger returns are almost always available from some new way to play differential interest rates, new ideas tend to get a hearing. Hence there is a favorable environment for institutional innovations. Since the significant institutional innovations during a period of monetary constraint will be those which tend to increase velocity, they can be represented as shifting the velocity-interest rate relation to the right.

The resultant velocity-interest rate relation is the sum of the effect of a change in interest rates within unchanging institutional arrangements and the effects of changes in institutions. While an institutional innovation in the money market is working its way

through the economy, the net effect is as if the velocity curve were infinitely elastic. The resultant velocity-interest rate relation is a step function, as in Figure I. If I is the original velocity-interest rate relation, a rise in the interest rate from the liquidity trap rate r_0 to r_1 will induce institutional innovation I' which, in time, shifts the velocity-interest rate relation to II. As a result at a constant interest

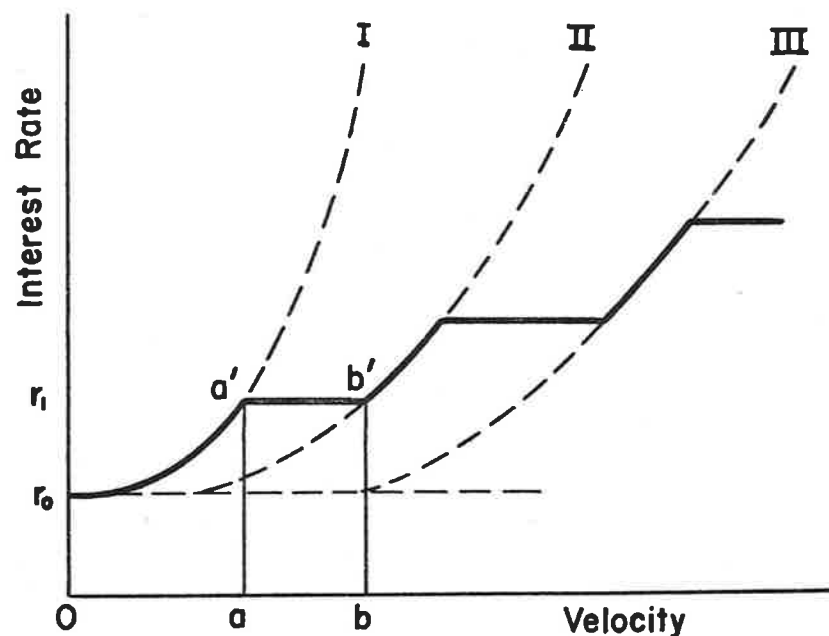


FIGURE I

INSTITUTIONAL CHANGES AND VELOCITY

rate, the amount of additional lending associated with a rise in velocity from a to b will be effected during the time that it takes the institutional innovation to work its way through the economy. Of course, during this time, there may be short-run increases in the interest rate above r_1 , if the short-run demand for financing increases by more than the increase in financing implicit in the rate at which the institutional framework is changing.⁹

9. Actually a fall in the interest rate below r_1 will usually not result in the end of the institution whose introduction shifted the velocity relation; so that the effective velocity-interest relation is not infinitely elastic with respect to a fall in interest rates; the movement from a to b is irreversible. Also the interest rate which induces the innovation may be higher than the rate necessary to sustain the institutional change so that the line $a'b'$ may be negatively sloped rather than

Whenever such an institutional change in the money market is working its way through the economy, restrictive monetary policy, to be effective, must offset the rise in velocity by decreasing the quantity of reserves. Purely passive constraint which operates by not allowing the quantity of money to increase will not be effective in preventing inflation. Therefore, unless the central bank acts strongly to decrease the money supply, monetary policy has only a very limited domain of effectiveness in controlling inflationary pressures. The asserted asymmetry of monetary policy (that it is effective in constraining an inflation and ineffective in constraining a depression) is not true; monetary policy is of very limited effectiveness both in constraining an inflation and in counteracting a depression.

The reverse side of the coin to the increase in velocity is that every institutional innovation which results in both new ways to finance business and new substitutes for cash assets decreases the liquidity of the economy. That is, even though the amount of money does not change, the liquidity of the community decreases when government debt is replaced by private debt in the portfolios of commercial banks. Also, when nonfinancial corporations replace cash with government bonds and then government bonds with debts of bond houses, liquidity decreases. Such a pyramiding of liquid assets implies that the risks to the economy increase, for insolvency or even temporary illiquidity of a key nonbank organization can have a chain reaction and affect the solvency or liquidity of many organizations.

If, during a long prosperity, monetary policy is used to restrain inflation, a number of such velocity-increasing and liquidity-decreasing money-market innovations will take place.¹ As a result, the decrease in liquidity is compounded. In time, these compounded changes will result in an inherently unstable money market so that a slight reversal of prosperity can trigger a financial crisis.

horizontal. The relations among velocity curves are analogous to the relations among an industry's short-run and long-run supply curves, excepting that the price which will induce investment seems firmer than the price which will induce innovation.

Gurley and Shaw (*op. cit.*) in discussing nonbanking sources of financing state that "Because money becomes a smaller share of total financial assets, velocity becomes a less reliable index of interest rates" (p. 533). They fail to distinguish between the velocity-interest rate relation with constant institutions and the effect of high interest rates in inducing money-market innovations.

1. "In the 1920's nonbank intermediaries gained on banks at an especially rapid rate. The ratio of their assets to assets of banks rose from .77 in 1922 to 1.14 in 1929" (Gurley and Shaw, *op. cit.*, p. 533, footnote 19).

IV. IMPLICATIONS OF THE EXPECTATION THAT INSTITUTIONS WILL CHANGE

The argument thus far has shown that money-market institutions do evolve, especially under conditions associated with tight money, and that such developments in the money market tend to counteract a tight money policy. As a result during a strong boom, interest rates will not rise very much for the supply of financing is, in fact, very elastic. Associated with the ability of the money market to finance an inflationary expansion is a decline in the liquidity of households and firms. To the extent that either the most liquid assets leave the banking system for the portfolios of other financial institutions or the debts of the newly grown and developed financial institutions enter the portfolios of banks, the liquidity of the banking system declines.

Declining liquidity of banks, households, and business firms has two attributes. One is that the debt-net worth ratio rises. The other is that the vulnerability of money-market assets to a fall in value increases. The two attributes of declining liquidity reinforce each other so that the chances of insolvency and illiquidity increase simultaneously.

A major limiting factor to the decline in the value of any asset is the terms or the price at which it will be monetized by the central bank. However, the evolutionary changes in the money market result in both new kinds of assets and new kinds of financial institutions. One view of the central banks' money-market responsibilities limits them to the maintenance of the liquidity of the banking system and orderly conditions in the government bond market. A central bank with such a view of its money-market responsibilities would not stabilize the new assets either by purchasing or discounting them.²

On a priori grounds neither the operators in the money market nor the central bank authorities know the limitations of new institutions and paper. And, unfortunately, in a boom they are not particularly concerned with the possibility of a financial crisis. Hence the newly found profit opportunities will be exploited to such an extent that the money market becomes unstable. In an unstable market a slight deviation from equilibrium has widespread repercussions. Hence, once the money market evolves into such an unstable

2. The asset (government bonds) and the institution (commercial banks) involved in the two money-market changes taken up in Section II will be stabilized by the central bank. Hence no real financial instability can result from these changes. However other, perhaps still potential, changes (for example, the development of techniques by which "small" cash balances of corporations can be used to finance business or, alternatively, the financing of sales finance companies by corporation funds) are not protected by the Federal Reserve.

situation, a financial crisis can be expected. The collapse of a portion of the financial market results in both a loss of net worth and of liquidity by households, business firms and other financial institutions. Even if the financial crisis is not generalized, economic units will revise their view and desire more liquidity. A tendency to use savings to liquidate debt and hence to increase the ratio of net worth to debt will arise; this has a depressing effect upon income. Thus the "shock" from the financial sector can create a situation which leads to a deep depression. The financing of an expansion by increasing velocity tends to create a situation in which both a financial crisis and a deep depression are possible.

The attitudes of both central bankers and other members of the money market during a boom can be characterized as a version of the Maginot line mentality. The defense against the imperfections of the financial mechanism that was revealed in previous depressions is now perfect, the money market is now working well, hence there is no need to worry.³ However, the institutions of the money market are constantly changing and as a result of these institutional innovations, the next financial crisis will never be just like the last one. What is required to counteract the effects of such evolutionary developments is a broadened view of central bank responsibilities and a clear recognition that, in spite of corrective steps, the money market will always stretch liquidity to the breaking point during a boom.

To date the Federal Reserve System is a lender of last resort to a commercial bank in distress. It is not a lender of last resort to the money market. In contrast, the classical Bank of England position was as a lender of last resort to a financial intermediary, the discount houses, which, in terms of the paper available, deeply penetrated the British money market. A broad view of a central bank's responsibilities includes the maintenance of the stability of, and acting as a lender of last resort to, a broad segment of the financial market. Hence as new financial institutions develop and as new types of paper appear on the money market, such institutions and paper would not necessarily be ineligible for central bank aid in time of crisis. Hence the central bank would prevent the widespread loss of liquidity resulting from a crisis in one segment of the market.⁴

3. In this connection note that if the great depression of the 1930's is imputed to the stock market boom of the 1920's which, in turn, is imputed to widespread margin trading, the Federal Reserve today has control over margin trading. On the other hand, if stock market collateral is very important in the financial structure, should not the central bank's responsibility include the maintenance of its value?

4. Gurley and Shaw (*op. cit.*, pp. 536-38) write of Financial Control as an alternative (or adjunct) to Monetary Control. Essentially our perspectives are

A policy of monetary constraint would still induce institutional innovations which would result in stretching liquidity. However even after the money market becomes unstable, the central bank, by monetizing the vulnerable asset, can prevent widespread repercussions from occurring. After stabilization, if a money-market institution or usage is considered undesirable because it inevitably leads to instability, then it could be got rid of by legislative or administrative measures.

That the effort by the central bank to control inflation abets the development of unstable conditions in the money market may seem to be a dismal conclusion. Actually, it is too much to expect that a trivial set of operations such as those labeled monetary policy or fiscal policy will always succeed in maintaining stability in a dynamic economy. Institutional innovation is one aspect of a dynamic economy and money-market innovations occur in response to the needs of a growing economy. That these changes will tend to undermine the effectiveness of stabilization policies is a by-product of growth.

However, the role of the central bank is not really diminished by the recognition of its ineffectiveness in preventing inflation as well as in stemming deflation. The central bank's function is to act as a lender of last resort and therefore to limit the losses due to the financial crisis which follows from the instability induced by the innovations during the boom. A combination of rapid central bank action to stabilize financial markets and rapid fiscal policy action to increase community liquidity will minimize the repercussions of the crisis upon consumption and investment expenditures. Thus a deep depression can be avoided. The function of central banks therefore is not to stabilize the economy so much as to act as a lender of last resort. This they are able to do.⁵

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the same except that Gurley and Shaw seem to hold hopes that financial control can aid in achieving stable growth; whereas I maintain that financial instability in boom times is inevitable but that a properly designed and operated central bank can ameliorate its effects. Essentially the difference is one of problems and intuitions.

5. This perspective on central bank abilities is not unlike that of L. W. Mints, *Monetary Policy for a Competitive Society* (New York, 1950) and H. Simons, "Rules Versus Authorities in Monetary Policy," *Journal of Political Economy*, XLIV (1936), 1-30.